APR 17 1974

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MINK

PRODUCTION

MANAGEMENT AND NUTRITION

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P 1043
1959
(1969 print)
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CANADA DEPARTMENT OF AGRICULTURE PUBLICATION 1043 1965

FOREWORD

This bulletin deals briefly with some phases of mink ranching. It is based on successful practices of breeders and experimental work at the Experimental Fur Ranch, Summerside, P.E.I.

MINK PRODUCTION—MANAGEMENT AND NUTRITION

Mink ranching originated in Canada at the beginning of this century and has grown to be an important branch of the Canadian fur-farming industry. Mink (*Mustela vison* (Schreb.)) are the larger members of the weasel family, Mustelidae. Male animals are larger than females, weighing approximately twice as much. The color of wild mink varies from light brown to almost black. Canadian ranch mink are derived chiefly from two strains—the eastern strain from Quebec and Labrador, and the larger northwestern or Yukon strain. However, these strains have been crossed so extensively that they are no longer readily distinguishable in ranch-bred mink.

Location of the Mink Ranch

The mink ranch should have easy access to transportation facilities, and should be close to cold storage facilities, feed supplies, a supply of clean water, and a source of electric power.

Where sheds are used to house the mink, it is generally advantageous to have them in a north-south direction to equalize the light on both sides. The site should be well drained, with some shelter from excessive winds and snow drifts.

Housing of Mink

Mink are reared in pens arranged in batteries, or in small individual pens supported on stringers. These may be exposed to the weather or enclosed in a shed. Where the climate is mild mink do well in outdoor pens, and these are less expensive to construct than sheds. Generally, however, sheds are better suited for breeding and rearing mink in Canada.

Sheds and pens may vary according to individual preference and local weather conditions. The construction should provide for sanitary, warm, dry nests with good ventilation. Sheds should be constructed to facilitate cleaning operations, rearing of the young, and proper furring of the mink.

Guard Fence

As a safeguard against mink getting out of the ranch, a guard fence should be built around the sheds and pens. The fence also helps to prevent the introduction of infectious diseases by keeping out other roaming animals. A high guard fence constructed with boards gives the mink a certain amount of seclusion.

In the most common type of guard fence cedar posts and 2- by 4-inch stringers are used as a supporting framework for wire mesh. The wire commonly used is 1-inch mesh of number 16 gauge, 5 feet in width. One foot of the wire is embedded in the ground to prevent mink from digging under the fence. To prevent them from climbing over, a strip of galvanized iron 12 inches wide is used above the wire around the top of the fence.

Breeding Stock

An ideal breeding mink should be large, free from hereditary abnormalities, a good feeder, and from a prolific strain that has commercially desirable fur and color. For adult animals, breeding vigor, and the quality of the progeny are of great importance.

The manufacturer of mink garments will pay a premium price for extra large mink pelts where the quality is comparable to that of fine-textured, smaller pelts. Nevertheless, mink ranchers should not select for size at the expense of texture and quality of the fur.

Quality in a prime mink pelt is a blend of several fur characters resulting in a commercially desirable type. The guard fur must cover the underfur completely in a uniform manner without breaks. The tips of the guard hairs should appear in an even sequence when the mink is viewed from the side, so that the fur does not have an uneven contour, or "spiked" appearance as it is called in the trade. When the guard fur is uneven or patchy over the body, the underfur shows through, and the pelt has an undesirable mottled appearance.

The underfur of a mink pelt is of paramount importance. Dense underfur of the proper length and color is a major factor in determining the quality of mink fur. The length of the underfur relative to that of the guard fur is designated in the trade as the nap of the fur. Medium nap, the nap chiefly in demand by the fur manufacturers, has guard fur approximately $\frac{3}{4}$ inch and underfur $\frac{1}{2}$ inch in length.

Color is also a very important character. Standard mink are classified as black, extra dark, dark, and brown. The fur of black mink lacks contrast and is not desirable. Among standard mink the extra dark color phase is the most desirable. The colors of mutant mink vary widely through different shades of brown, beige, blue, gray, cream to white. Self-colored mutants are the most desirable because of the difficulty in matching mottled colored pelts.

The underfur of standard mink should be of a blue or slate cast. In mutation mink, because of the great variation in the color of the underfur of different mutant types, the emphasis is placed on clear-colored underfur which blends with that of the guard fur.

Soft silky texture is also a very desirable quality in mink fur. When rubbed with the side of the forefinger the pile of the fur along the back should simulate fine wheat flour in texture. It should not feel sandy or rough.

Mink should be carefully examined in a catching box or examining pen in shade and in sunshine. In addition the actual texture of the fur should be determined in closer proximity and an inspection of the color and density of the underfur made.

A beginner can acquire a fair knowledge of the value of mink fur quality from expert fur graders and manufacturers of mink garments, or at mink shows and ranches where different types and animals with varying fur quality may be seen.

Mating Procedure

Successful mating during the breeding season, usually from March 7 to April 7, is highly important if a good crop is to be obtained. Careful attention to mating procedure is also very important.

A female may come in heat from one to four times during the breeding season at intervals of about 6 to 8 days. One procedure is to try females with males every other day until a successful mating takes place. The female may be mated again the next day if male animals are plentiful, or she may be tried again six days later and every other day after that period until the 14th day. At that time, if she has not accepted a second mating, she is usually pregnant. However, it is important that the attendant should watch the pair, at a reasonable distance, to determine whether a true mating takes place.

When a difficult female mink has almost reached the end of the breeding season and has been tried every second day without having accepted service, a fertile mating can sometimes be obtained by placing her with several males

one after the other, until she is tired out. Particular care should be taken toward the end of the breeding season that old males are not permitted to become savage with the females and bite them excessively or even kill them.

In mating procedure, the male is usually taken to the female's pen, except in the case of untried young males, when it may be preferable to take the female to the male's pen. Time is saved by taking female mink to the male pen, but usually it is easier to train the smaller number of male mink to get in the catching box. When a removable nest box system is used, it is preferable to take all females to the males. Matings are more readily obtained from old experienced male mink than from kit males.

Young males which are sexually under-developed may be slow breeders. Therefore, it is important that such males be handled carefully until they have had one or two successful matings. Methods of initiating young males are as follows:—

1. Place a young female mink with a kit male the day after this female has been mated to another male. The oestrus period in mink usually lasts two days, and the female is usually quite tractable the second day of heat, after having mated the previous day.

2. Place a young female mink with a kit male immediately after it has been determined she is in heat by the use of another adult male.

Copulation may last from 15 minutes to 2 hours. Long matings are not a criterion of fertility and some breeders terminate matings after 30 minutes in order to conserve the male. Two services per day are usual for an adult male and one mating per day for a kit male. An adult male may have as many as 25 to 30 single matings in a breeding season, whereas a kit male may mate only two or three females.

All males should be tested for fertility at the beginning of the breeding season. This is done by taking a smear from the vagina of the female mink immediately after the first mating of the breeding season for that particular male. The presence of an abundance of normal-shaped, active spermatozoa in the smear (when examined under a microscope at 200 magnifications) is accepted as evidence that the male mink in question is probably fertile.

Matings that occur during the last two weeks of March are generally more productive than those taking place earlier in the breeding season. Therefore, many experienced mink ranchers use their best sires just once on each female at the later date. This enables the rancher to spread their desirable qualities through the ranch to a greater extent, and with the greater assurance of obtaining litters. It is important to note that the progeny will usually result from the final mating, if it is fertile.

Gestation Period and Weaning

The gestation period of mink varies from 40 to 70 days with an average of 52 days. The first indication of birth is usually the whimpering of the young kits in the nest box. This is a normal phenomenon. The female mink will usually fail to eat that day and it is wise to give her a light feeding on the following day. If this feed is completely eaten the regular feeding schedule may be resumed.

A rancher should wear the same clothes and have the same daily routine of feeding during the gestation period so that the pregnant mink will become accustomed to both. Strangers should be strictly excluded from the ranch during the whelping season and for a period of three weeks after the kits are born. If the kits are not doing well and whimper continually, the mother is probably not supplying them with enough milk. The nest boxes should be examined and the kits distributed to other lactating females to suckle.

A litter may vary from one to 10, with an average of 3.6 kits to the litter for females kept.

When the kits are 3 to 4 weeks old they begin to suck meat. By the time they have reached 8 to 10 weeks of age, they can be weaned and placed in separate pens. Some ranchers prefer to wean at 4 to 6 weeks of age, especially when the mother appears to be in poor condition.

Rations and Feeding

Nutritional Requirements

The nutritional requirements of mink differ from those of other species of animals because the mink has a relatively short intestinal tract and the passage of feed is rapid. Accordingly, readily digestible rations with a low fiber content are desirable.

The mink is a carnivorous animal and its main natural feed is meat or fish. Under ranch conditions this is supplemented with cereals, vegetables, minerals, and vitamins. The rations must supply the varied requirements for growth, fur development, breeding, and lactation. However, considerable variation may exist in mink rations and still produce satisfactory results. The general nutritional requirements of mink are supplied in rations containing meat or fish as sources of animal protein. Horse meat, whale meat, tripe, offal meats, fish of different species, chicken waste, and liver are the main items used.

The cereal portion of the ration may be in the form of cooked, ground cereals or a commercial cereal that is fortified or unfortified. This provides plant protein, minerals, vitamins, carbohydrates, and a fiber content adequate for a mink diet. A ration may need to be supplemented with vitamins, if these are not in adequate amounts in the commercial cereal mix or the other ingredients.

Changes are usually made in mink rations during the growing, furring, and reproductive seasons to meet more adequately the requirements for protein, minerals, and vitamins in these phases of mink ranching. During the period of rapid growth in kit mink, a diet containing a high protein content of good quality with a supplement of calcium, phosphorus, and vitamins is required. In the furring season, diets with higher carbohydrate content can be used to fatten the animals and increase the density of the underfur. During the winter months and breeding season, mink can use a relatively high content of cereals in the ration, and also a high proportion of the red meat can be replaced by good quality, non-fatty species of fish which do not contain thiaminase.

Ingredients for Mink Rations

Standard mink rations in past years were based chiefly on horse meat and commercial cereal. Both of the above products are relatively high priced and horse meat is scarce. Accordingly, a demand has arisen for substitute products that might be used to replace part or all of the above ingredients in mink rations. Therefore, substitutes such as whale meat, cheaply available whole fish, fish by-products, and cooked ground cereals have been tested in mink rations at the Experimental Fur Ranch.

As sources of protein, tom cods, small flounders, and cod fish offal, have been found useful to replace a high percentage of the more costly red meat proteins. Cooked ground wheat has also been found adequate to replace the carbohydrate portion of the diet supplied by commercial cereal in mink rations.

Where fish are economically available, they can be used to replace a high proportion of the meat in the rations. Ocean white fish and other species of fresh and salt water fish with a low fat content, are the most suitable for mink rations. Certain species of fish, mostly of fresh water origin, contain an enzyme thiaminase, which destroys vitamin B_1 in the feed when the fish are fed in the

raw state at significant levels for a period of time.* The danger can be overcome by cooking the fish or feeding them raw on alternate days in the feeding schedule.

When fortified commercial cereal mix is used, the rancher should take into consideration the recommendations of the manufacturer with respect to the addition of other ingredients to make a balanced ration.

Additional supplements of vitamins to mink rations are unnecessary where adequate levels of liver, cod liver oil, wheat germ, brewers' yeast, and tomatoes are included in the feed. Liver is an essential ingredient in any mink ration, chiefly because of its high content of folic acid and B_{12}, cyano-cobaltamin. These vitamins prevent the development of anaemia. Usually 5 to 10 per cent of liver is adequate in mink rations. A suitable form of calcium (bonemeal, milk powder, etc.,) should be included if it is not supplied in the commercial mix used in the rations. Trace minerals, such as iron, copper, manganese, and iodine are present in adequate quantities in the rations for normal metabolism of mink.

Practical Ration Formulation and Feeding Rations Tested at Summerside.

Table I shows the percentage of ingredients used in a number of rations at the Experimental Fur Ranch with (standard) dark mink. These rations have produced successful results with growth, furring, mating, and reproduction. Mink on these rations have been free from evidence of vitamin deficiencies and other conditions frequently associated with faulty nutrition, such as nursing sickness, wet bellies, cottony underfur, yellow fat, hip rub, tail chewing, and bladder stones.

In Table I, rations A, B, and C are standard rations, whereas D to L are modifications of these rations used to test whale meat (pothead), fish, cod fish offal, and cooked ground wheat, as replacements for the horse meat and commercial cereal, respectively, in the standard rations.

Ration A is a growing-season ration in which there is a relatively high proportion of red meat protein. This is required to obtain good growth in kit mink.

Rations B and C are, respectively, breeding and furring rations. The former contains a high proportion of fish as a replacement of red meat and also has an increased cereal content. This combination of nutrients with its higher caloric value fed during the cold weather, has been found to give successful results in the mating and reproductive phases of mink ranching procedure. Ration C is a furring ration in which the red meat is reduced and it is used in combination with tripe or offal meats of lower grade proteins. The reduction of red meats aids in the prevention of rapid priming and the development of off-colored fur. The higher cereal content also aids in fattening the mink and increasing the density of the underfur during the cooler autumn weather.

In experimental feeding trials with rations D, F, and H, different levels of cooked ground wheat were used to replace commercial cereals, and fish was used to replace a high proportion of the horse meat in the rations. It was found that rations F and H, with the cooked ground wheat and fish supplement, produced significantly greater growth than the control ration D with a commercial cereal. Similarly, rations with the same amounts of cooked ground wheat and horse meat without fish, produced the same increase in growth, comparable to rations F and H.

During the furring season (September to November) these rations were changed to E, G, and I, so that the fish content (tom cods and small flounders in equal amounts) of the rations was reduced. Furring results were comparable on these three rations and similar growth results were also produced with horse meat and no fish in these rations.

TABLE 1.—MINK RATIONS WITH INGREDIENTS IN PERCENTAGES

Nutrients	Ingredients	Rations											
		A	B	C	D	E	F	G	H	I	J	K	L
Protein	Horse meat	55	35	25	10	35	10	35	10	35			
	Whale meat (Pothead)	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	42	31
	Tripe or offal meats	10	.....	30	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Fish *	.....	20	.....	45	20	45	20	45	20	.....	20	30
	Eggs **	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbohydrates	Commercial mink meal	20	30	30	30	30	15	15	.....	.....	24	24	30
	Cooked ground wheat	.....	.....	.....	.....	.....	15	15	30	30	.....	.....	.....
Minerals	Bonemeal (Commercial steamed)	.....	.....	.....	.....	.....	0.5	0.5	1	1	.....	.....	.....
	Milk***	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vitamins	Liver (Fresh)	10	10	10	10	10	10	10	10	10	10	10	5
	Yeast (Dried brewers')	1	1	1	1	1	1	1	1	1	.....	.....	.....
	Cod liver oil	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Vegetables	Canned tomatoes	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
	Total	100	100	100	100	100	100.5	100.5	101	101	100	100	100

* Tom cods and small flounders in equal parts.

** Eggs, boiled 10 minutes and mixed in the rations, one per 10 mink.

*** Whole cows' milk used to mix ration to hamburg consistency during July and August,

It may be noted that because commercial cereal is fortified with calcium and phosphorus, an addition of 0.5 per cent bonemeal was made to porridge-supplemented rations F and G, and 1 per cent to rations H and I.

Breeding and reproduction with standard dark mink on ration H, with cooked ground wheat and a high proportion of fish (flounders and tom cods in equal parts), produced comparable breeding results to the control ration with horse meat and commercial cereal.

Two experiments were carried out in which whale meat (Pothead) was used in different amounts to replace horse meat in rations J, K, and L. In the first experiment, whole fish (tom cods and small flounders in equal parts) were ground and mixed with the whale meat in the proportions shown in rations K and L. These rations produced growth comparable to that of control rations with horse meat used in the same amounts as the whale meat. However, furring results with ration L, in which equal parts of whale meat and whole fish were used, produced off-colored fur with a reddish cast.

A second experiment conducted with the same levels of whale meat, but with cod fish offal (of Newfoundland origin) as the fish supplement instead of tom cods and flounders, in otherwise comparable rations to J, K, and L, produced not only as good growth but also as good furring results as the control rations containing horse meat. Detailed results of the findings with the experimental rations shown above can be obtained by writing to the Experimental Fur Ranch.

Supplementary Rations for Young Kits

From the time kits are 3 weeks of age until weaning date at 5 to 7 weeks of age, it is advisable to supplement the regular ration with a morning meal for the kits. This meal can be conveniently fed in deep pie plates placed inside the pens. Half a pint of whole cows' milk, in which a shredded wheat biscuit has been soaked, adequately supplements the regular feed. It is particularly beneficial to females with large litters. This supplement relieves the strain on lactating females and aids in the prevention of milk sickness. It is fed during the month of June.

Preparation of Ration and Feeding of Mink

The routine practice of feeding the mink has been as follows:—

Changes are made in the rations at the beginning of the growing season (June to August), furring season (September to November) and the breeding season (December to May).

Frozen meats and fish are thawed and then ground through a screen grid with openings of 5/16 inch in diameter. The meats and cereals are then thoroughly mixed together with water or milk to a hamburg consistency. The feed is prepared and fed to the stock in one daily feed, throughout the year, except for a supplement fed to young kits.

Amounts of feed for adult mink vary according to individual appetite and sex, but average 7.5 ounces (before the addition of water) daily. The feed for adult mink is placed on top of the wire. While the kits are young they are fed in pans placed in the pens. Young mink are fed (ad libitum) all they can nicely clean up during their rapid period of growth.

Watering pans should be attached low enough on the wall of the pen to permit young mink to drink water as soon as they can get out of the nest box. Adult mink should also have access to water in all seasons. During freezing weather, blocks of snow may be placed in the pens instead of water.

Specialized Feeding Problems with Mink

It is important to keep a check on the fat content of mink rations because a high intake of fat reduces the amount of other essential ingredients eaten which may be too low for good nutrition. Reduction in fat content usually can be

accomplished by trimming excess fat from the horse meat and by using non-fatty fish. The amount of fat in the ration should be especially noted during the breeding season because high levels of unsaturated fatty acids in horse and fish fats significantly reduce the vitamin E in the ration. No rancid fats should be used because of the toxic nature of the peroxides formed and also because of the destruction of vitamins E, A, D, and B complex factors, such as pantothenic acid, biotin and pyrodoxin, causing adverse effects upon furring and reproduction. During other seasons of the year, it is considered inadvisable to feed more than 8 per cent of fat in the ration. If fat is added to a mink ration, it should have a melting point below the body temperature (102°F) of the mink so that proper emulsification takes place and it can be used by the mink. Suitable fats are horse leaf, pork and horse marrow, and chicken fats.

Other recommendations that are important in the feeding of mink are:

(1) Avoid the use of chicken waste containing diethylstilbesterol, during the months of January to June.

(2) Avoid the use of raw eggs because they can cause biotin deficiency. Boiled eggs can be mixed in the feed and are a good supplement to mink rations.

(3) Avoid the use of meats and fish that have been held in cold storage for over 10 months, unless antioxidants are used.

(4) Avoid the use of coarsely ground green bone or fish bones in the rations of young mink.

(5) If bladder stone is prevalent among the mink, use 1 gram of ammonium chloride per mink per day or phosphoric acid 12.5 ounces per 100 pounds of feed daily, before addition of water to mix the feed.

(6) Avoid the use of over 15 per cent hake or whiting fish in the ration during the growing and furring seasons.

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Copies of this publication may be obtained from:

INFORMATION DIVISION
CANADA DEPARTMENT OF AGRICULTURE
OTTAWA

FIRST PRINTED 1959
REPRINTED 1965, 1969

©
Queen's Printer for Canada
Ottawa, 1969

5M—34968—11:69

Cat. No.: A53-1043